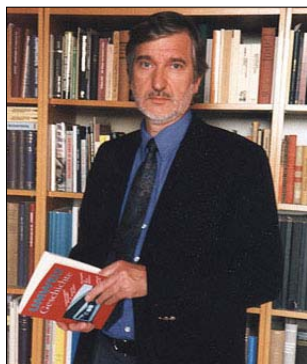


# The German Innovation Machine: Dead or Alive?



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## To Reform or to Start from Scratch?

**I**NNOVATIONS DO NOT fall from heaven like manna. Nor can they be jump-started by policy campaigns no matter how much money is pumped in. Innovations are the result of gradually acquired abilities in science, business, and society. They involve receptive patterns of thinking and acting nested in a framework of economic and social institutions, in an established social system of production that, ideally, becomes a smoothly functioning innovation machine. The ability to innovate means the art of creating new

and for other kinds of ‘progress.’ It is essential to every society resting on the belief that it can shape its own future.

Germany has long had a first-rate innovation machine. It is thus all the more poignant that its ability to innovate and, hence, its competitiveness and sustainability is now sorely doubted at home and abroad. According to critics and others, it is not innovative ability *per se* that the German economy lacks but rather the power to innovate on certain markets that the whole world assumes to be auspicious. They are commonly considered part of the new economy. Opinion differs on what to do about this weakness in innovation. Some observers advocate reform of the existing social system of production. They seek to free it of sclerosis, overextension, and the runaway growth of welfare state activities throughout decades of success. Others regard this system as obsolete and see a compelling need to start anew. They argue for replacing the existing production regime with a new one and for adopting new social rules modeled on those in the United States. Most participants in the present discussion, however, see the cure in a motley combination of reforms and radical changes that they stir

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markets and new rules of the game whose adoption improves people’s productivity and opportunities in life, whether through novel developments, inventions, other scientific insights, or creative thinking and behavior. The ability to innovate is associated with the hope for a better life

together without too much bother. A clear basis for decisions is possible only if this confusion is overcome.

### The German Model under the Gun

The cardinal question is whether the German innovation machine - the country's prevailing social system of production and its social rules - can cope with contemporary challenges. At first glance, one might not be sure, for most of its parts are more than a century old (see Table 1). Reservations have centered on the specifically German principles underlying the organisation of the economy (production regimes). Persistent mass unemployment since the late 1970s has led to increasingly frequent claims that the German production regime is

incapable of adapting to new, innovative product markets, for which globalisation is said to require highly flexible entrepreneurial decision-making processes. Although faith in the economic and social superiority of the 'Rhenish model of capitalism' (Michel Albert) publicly prevailed just ten years ago (and still does among many experts), mounting scepticism has prompted speculation about the necessity of retreat, given the political, media-related, and cultural influences of its American competitor. The properties of the 'German model' that were prized by earlier reformers abroad - the long-term character of entrepreneurial decision-making and the German production regime's close-knit cooperative structures - are the very ones that seem to

make it difficult for today's German economy to accommodate new circumstances quickly. The system has strengths and weaknesses that condition each other. What it gains through cooperation, stability, and sustainability, and the competitiveness it enjoys on many markets because of these comparative institutional cost advantages, keep it from adapting rapidly in highly innovative markets. Its elements are so tightly inter-linked that they preclude selective strategies for innovation. A decision must be made for or against the entire existing social system of production. It is all or nothing.

**Table: Institutional Framework of the German Economy**

Table 1. Institutional Framework of the German Economy

Social system of production	Production system	Legal system	Social Security system	Research landscape
Finance system: All-purpose banks (since the 1870s/1934/1952) <i>[1945–1952]</i>	Diversified quality production (since late 19 <sup>th</sup> century)	Corporate governance: Joint-stock Corporation Act (since 1884/1897/1931/1937/1965)	Health insurance (since 1883)	University research (since 18 <sup>th</sup> century/1819/1920/1969)
Economic Interest Intermediation: Primacy of the economy (since 1879/1897); Primacy of the state <i>[since 1931/1949/1933]</i>	Growing share of nonmaterial value creation (in the 20 <sup>th</sup> century)	Regulated competition (since 1897/1923/1958) <i>[1945–1951]</i>	Accident insurance (since 1884)	Unity of research and teaching (since 1810)
Intercompany system: "Corporatist coordination" (since 1879/1918/1934/1936/1949/1951) <i>[1945–1951]</i>	Dualism: Diversified quality production and standardized mass production <i>[1933/1941–1970s]</i>	Commercial law (since 1897)	Old-age insurance (since 1889/1911/1948/1957/1972/1992)	Applied research/technical colleges since end of 19 <sup>th</sup> century/1949 Fraunhofer Society of Industrial Engineering (since late 19 <sup>th</sup> century)
Industrial relations: Codetermination (since 1890/1905/1916/1920/1951/1952/1976) <i>[1933–1947]</i>	Crisis in standardized mass production <i>[1970s]</i>	Civil law (since 1900)	Unemployment insurance (since 1927)	
Qualification system: Dual system of vocational training (since 1869/1897/1938/1969) <i>[1945–1951]</i>	Diversified quality production with mainly nonmaterial value creation (since the 1970s)	Welfare state: Socially equitable freedom of contract (since 1919/1949)	Long-term nursing care insurance (since 1995)	Cutting-edge research (Kaiser Wilhelm Society since 1911/1920/Max Planck Society since 1946/1948)

Note: Years in parentheses express continuity in change; years in *italicized, boldfaced brackets* express discontinuities.

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The German economy is under fire. Dissatisfaction with corporate governance is especially intense. It extends to the financial system, whose focus on all-purpose banks is blamed for the alleged undersupply of venture capital in Germany's New Economy. There is also discontent with the system of industrial relations, whose German flagship - codetermination, or the right of workers to participate in controlling shop-floor conditions and management decision-making - prevents quick decisions by senior management. The organisation of businesses at the intercompany level is reproached for being excessively coordinated by the associations, which leads to restraint of competition and overregulation of the labour market. Lastly, the dual system of vocational training stands accused of compounding and perpetuating the entire quandary through standardisation of qualifications and through creation of long-term mutual commitments between employer and employee.

Ask, however, what kind of challenges the system is expected to cope with, and the perspective changes. The two key ones facing the economy and society in the early twenty-first century - globalisation of the markets and the primacy of scientific methods and theories in the production process - were already playing their part when today's innovation machine took shape more than a hundred years ago. Almost all economic historians agree that the globalisation process started in the late nineteenth century and the catastrophes of the twentieth century only interrupted it, occa-

sionally driving it almost completely from the public mind. There is broad agreement, too, that the rise of intangible factors of production and the central role of science and research in the innovativeness of postindustrial national economies also began in the late nineteenth century. Not a few economists see this second economic revolution and its associated new institutional frameworks as the onset of an economic watershed whose magnitude far surpassed that of the eighteenth century's Industrial Revolution and ushered in the end of the industrial age more than a century ago.

Equally clear, however, is a certain market weakness for highly innovative products. This point lies where the flow of results from basic research must be converted quickly into profitable economic and social possibilities, as on the market for information technology (IT), biotechnology, and genetic engineering. A classic case is the embarrassing fiasco of the attempt to equip German expressways with a toll-collection system based on highly innovative IT. Unable to concentrate fully on solving the problem, the managements of the two global businesses main-

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Indisputably, Germany ranked with the United States as one of the pioneers of that development and is still strongly marked by it. This fact is reflected in Germany's extreme orientation to the world market and the dominance of New Industry, whose value-added is of an essentially intangible nature. Given this historical background, there is little reason to assume that the established social system of production in Germany is less conducive to innovation than the American system or that it fails to prepare the country for current challenges, which, historically speaking, are not all that new.

ly involved, DaimlerChrysler and Deutsche Telekom, evidently cannot do what would be a matter of course in U.S. companies: respond flexibly to the fatal consequences that the looming flop would have for their reputations. It is not co-determination that limits the maneuvering room of these German corporations. Nor is there any lack of technical solutions to the problems. The mismanagement clearly results from a lack of experience in dealing with enormously complex and exceedingly innovative production processes.

In Germany the social system of production is geared to what

Wolfgang Streeck calls 'diversified quality production'. As with highly innovative technologies, this (post)industrial mass customisation for the world market is about production processes in which value-added stems ever less from the conversion of material, as it used to with the classical Old Industry. It originates instead in integrated knowledge about many things, including market needs, solutions to problems through research and development, manufacturing processes, applications and processing possibilities, and integrated services that facilitate timely production, delivery, financing, and the assurance of other qualitative aspects. The German economy's strengths tend to lie where business, science, and industry, working on the basis of established technologies and rules, develop economic and social process innovations whose market success rests on the ability to offer diversified quality production and trust-building sociability. This description defines the new economy that developed early in Germany and still dominates numerous markets. It differs from the New Economy only in its applications and markets, not in its ability to innovate.

### **Germany's Resources: Quality, Networking, Trust**

This manner of production is embedded in a coordinated market economy, which is organised in such a way that neither the individual nor the state sets the tone. The rules by which it operates stem from a dense network of institutions and organisations whose actors in civil society (which Hegel

referred to as 'corporations') exist between the individual and the state. As a historical compromise consisting of the conservative social welfare state, Catholic social doctrine, and social democratic will for reform, the German economic order has long stood for social stability and new economic possibilities. It opens long-term horizons for adventurous business strategies and decisions, ensures a superior standard of quality and a motivated workforce, and affords the collective inputs from basic research that were crucial to this production pattern. The high density and integration of the institutional framework and the capacity for market sociability -the basis for building trust and reducing costs - are resources that have grown over long periods (see Table 1) and owe their existence to the peculiarities of German industrial development.

This system still has notable potential for innovation, as shown by both the specialisation index for patents and by the balance-of-trade accounts. The most dynamic performance of Germany's export economy is in automotive manufacturing, machine building, and the chemical industry, whereas it has had to curtail its presence considerably on the market for modern office machines and other IT components. Although the German export economy, unlike its American or Japanese counterparts, is not the complete master of any segment of the world market, the breadth and depth of its international position is surprising. This breadth indicates a strategy of differentiation centering on industries

with a relatively high degree of specialisation and productivity. The nation therefore weathers competition and cyclical fluctuations especially well. This capacity is manifested in the German export economy's ability to defend its position despite the soaring number of competitors on the world market in the previous decade.

Of course, Germany's continuous success with exports since the early 1950s is still based on the comparative institutional cost advantages that the German economy enjoys on markets for diversified quality products. Machine building, for example, a pivotal industry in every competitive export 'cluster', is no exception. Germany has vastly more competitive lines of machine building than the United States does. Conversely, the United States is far better positioned than Germany on the market for international services, where the management of large and complex systems counts as much as access to the skills of well-trained self-employed persons. The numerical relations of the two countries' national sectors are even more imbalanced in sectors where the use of electronic components is escalating, as is the case on the market for office appliances and Telecom products. Fears that this gap could quickly widen have proven unfounded. In fact, a market has developed in the manufacturing of machines for products of the New Economy, with the innovativeness of the German machine-building industry being demonstrated by a disproportionately great increase in patent registrations. The German economy appears to be

catching up with the U.S. economy and seems to be pressing on with 'innovative product modernisation,' albeit along different paths.

Not surprisingly, German companies have intensified their focus on technology, innovation, and customer-friendly product design. Pursuing this strategy, they often tend towards over-engineering and favour quality over price to a greater degree than competition necessitates. American companies aspire to price leadership more frequently than German companies do. No longer completely dominating electronic business, American companies

### **Is the German Economy in Danger of Failing to Keep Up?**

The cardinal question for the future then becomes whether the German production regime can keep proving its strength in the phase of a product cycle when basic innovations move on to process innovations. Can it repeatedly come through when newly developed technologies reach the stage at which the main thing is to utilise them for specific economic purposes? If so, that is where the German production regime could bring its comparative advantages fully into play. The German production regime would be able to demonstrate its strengths again and again.

regime has really become obsolete or whether it requires internal reform in order to adapt it to new external developments, to which it has long been oriented in principle. In contrast, the only response that seems out of the question is that of replacing individual elements of the system with 'modules' alien to it. The discrete components mesh tightly with each other. The resulting synergies account for much of the system's success.

There are already clear signs that entrepreneurial reform strategies based on concepts imported from the U.S. production regime have failed, as is the case with numerous transnational companies. Having experienced an initial phase of unconditional adaptation to American practices of corporate governance, financing, or industrial relations, German multinationals are beginning to ponder whether that change itself is the cause of their acute problems. The major German banks, a branch of the New Economy that has compelled this strategy of fleeing the portfolio of its own, long-standing sectorial culture, have not been served well by this strategy. What has happened to them could jeopardise the entire economy if its portfolio is overextended by selective reform. Despite massive efforts, the German banks have neither gained a footing in investment banking nor managed to straddle both cultures without neglecting their traditional core business. The economic and moral decline of Deutsche Bank is an instructive example.

Change in the social system of production is therefore bound to encroach on the iden-

## **“American companies have allowed their German rivals to take the lead in applying methods that link computer-aided design, work planning, and production”**

have allowed their German rivals to take the lead in applying methods that link computer-aided design, work planning, and production, although these CAD systems originated in American software laboratories of the aerospace industry. This example reveals that Germany's New Economy is strong primarily at converting established technologies into economic and social process innovations whose success rests partly on the capacity for diversified quality production and trust-building sociability. Germany's New Economy could live well with that role.

Lingering weaknesses would then be all the easier to offset through compensatory strategies, such as direct foreign investment, in order to exploit different comparative institutional and material advantages.

However, if the German economy steadily loses its ability to develop new product cycles on its own, it could eventually fail to keep up with shaping new product cycles. The overhaul of the German economy's institutional framework would then have to be tackled seriously. Given the present discussion, however, the question would be whether the German production

tity of German society more profoundly than most critics are aware when they call for thorough modernisation. That kind of discontinuity would not be unprecedented in German economic history. The era of the German empire gives an idea of how a production regime (the liberal market economy) can be quickly replaced by another (the coordinated market economy) after a long-smoldering crisis. But it also illustrates the ordeals that a society may have to endure in the process.

### **Efficiency in the Welfare State: Finland**

There is no reason to doubt that the coordinated market economy can creatively adopt the new developments arising from the knowledge and information society. Evidence that it can take them on lies in Germany's own historical experience. There are also other examples bearing out the experience that a welfare state in which cooperative labour relations prevail and in which government policies shape much of the overall context in which business is conducted is quite able to stand up to the American model on its own ground. Finland's rise to global leadership as a supplier of IT in the 1990s verified the possibility of achieving a high level of technology and competitiveness from quite different points of departure and economic development. The Scandinavians have not suffered the social inequality that the Californian model seems to foster, nor have they resorted to the authoritarian political means that Singapore and other southeast Asian 'Tiger States' use to survive in the competi-

tion of the global New Economy. On the contrary, the Scandinavians have succeeded in transforming the characteristics of their own social system of production into comparative competitive advantages. A union membership rate of 80 per cent - as is the case with the workforce in Finland - need not contradict the inherent laws of the new economy. That degree of organization can instead guarantee the stability of labour relations, which facilitates flexibility in shaping venturesome business strategies on innovative markets. In return, the unions have the security of the welfare state and the advantages that a growing economy means for employment and wage policy. A comparatively high rate of taxes and levies is productive and politically tolerable as long as it provides all citizens with an attractive level of welfare benefits, a high quality of life, and the infrastructure that is necessary for people and markets to perform well. The welfare state need not hinder the continued development of the new economy. It can open new markets, as is shown by the Finnish example of linking health care and IT.

As similar as Finland and Germany are in the pattern underlying their respective social systems of production, they are just as different in another respect. Emerging in the 1990s from relative poverty and a state of absolute backwardness in IT, Finland joined the world's top ranks in that field, boasting a cluster of more than 3,000 IT businesses with Nokia as corporate icon - not to mention Linux, an open source operating system with Finnish

roots challenging Windows. Germany, by contrast, lacks economic incentives for reforms, a problem resulting from satiation and a desire to maintain the status quo. But the country does have what it takes for reform.

### **Build on Your Own Strengths Rather than Imitate Those of Others**

The most important thing that German policy currently needs is a clear picture of the country's economic portfolio. What the economy can and cannot do is less a function of heroic decisions by policy-makers or economic elites than of abiding experience on markets and with corporate or economic cultures. Research on organisational behaviour teaches that attempts to move against the grain of one's corporate culture can fail, and often has failed, when it means leaving an established portfolio so as to succeed on weaker markets. Since the 1990s, most German companies have therefore concentrated on their core business in order to optimise their strengths. This recommendation would suit the German social system of production with its powerful economic culture. Institutions that have taken shape of extended periods can be destroyed quickly, but it takes a long time to build new rules and economic structures - with no guarantee that such a radical operation will succeed.

As long as the German innovation machine is not certifiably drawing its last breath, there is no meaningful alternative to trying to liberate it from decades of slag and to keep it compatible with new developments, including demographic ones. This per-

spective should direct the attention of reformers first to the erroneous decisions of the 1970s, which centered on the anachronistic industrial worldview rooted in the period of the economic miracle. There is not a moment to lose in adapting Germany's economic and social policy to postindustrial conditions. That adjustment is long overdue.

State intervention policy should begin at home, that is,

## “There is not a moment to lose in adapting Germany's economic and social policy to postindustrial conditions. That adjustment is long overdue”

with a redefinition of the government's role in the economy. Granted, the German innovation machine is inconceivable without its integration in the collective flow of goods attributable to the government's macroeconomic policies that set the overall context in which business is conducted. But that relationship does not mean unconditional acceptance of every protracted, rampant increase of state influence on the economy. Having issued from specific nineteenth century conditions that do not pertain anymore, many economic activities of the state, local communities, and regional authorities no longer automatically seem to warrant continuation. The areas of state involvement include public electric utilities; the transport and communications sector; financial institutions; the health-care sys-

tem; public and private safety; and the broad field of education, training, and research. The more structural change has moved macroeconomic demand for goods and services into these traditionally state-run sectors in Germany, the less the state has been able to respond appropriately on the supply side. A number of restrictions prevent the public sector from flexibly adapting its economic activity to market conditions

and from expanding its capacity to meet rising demand. Legal and mental vestiges of cameralist accounting, lack of management praxis, underdeveloped cost-consciousness, legal and political resistance to deregulated pricing of public goods and services, and, most of all, political constraints on using tax revenues to finance additional jobs - all these problems make the public sector appear unsuitable for managing the very areas of the economy that are the most dynamic.

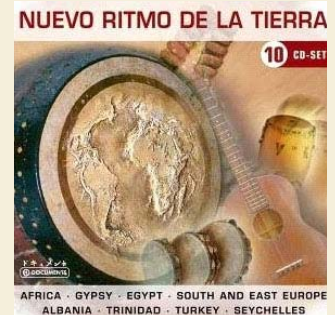
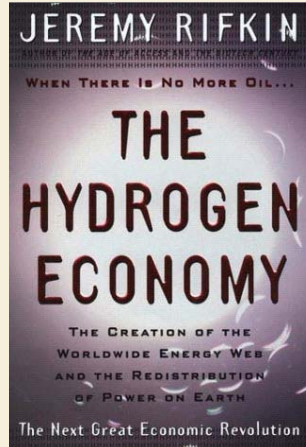
Privatisation usually seems a proven remedy - provided it does not encroach on the state's economic role where it is still important for ensuring the efficiency of the social system of production. Savings banks are such an exception, for their commitment to the common weal and to regional tasks still

seems indispensable to the comprehensive financing of investment in a national economy as decentralised and oriented to small business as Germany's is. Above all, a production regime based on diversified quality work is inconceivable without a training and research system whose unrestricted access guarantees equal economic opportunity as well as the full mobilisation and use of human capital. Elite universities are not required in order to provide those essentials. The German innovation machine depends instead on high-quality broad education. Once that quality is ensured, however, elite universities would not hurt. Cutting edge research, too, has long been among the institutional foundations of the innovativeness of Germany's social system of production.

Since the end of the great antagonism between the economic systems in East and West, divergent cultural factors have conditioned the global economy more and more. That reality suggests a course of action focused on streamlining the institutional framework yet also retaining its characteristic features and emphasizing its competitiveness. A good deal of evidence refutes the notion that there is only one way to ensure long-term competitiveness on the world market. That path need not be that of homogeneous entrepreneurial 'best practice' shaped by the neoclassical ideal of deregulated markets and unrestricted entrepreneurial prerogatives. History demonstrates that different market conditions veritably demand institutional variants on the supply side. Production regimes

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characterised by a dense institutional landscape in which fixed rules have evolved, as in most European countries, need not be less competitive than U.S.-style national economies with weak institutions, which leave organisation and controllability primarily up to markets and hierarchies. German economic policy at the dawn of the twenty-first century should therefore not be confined to imitating innovation regimes of successful competitors but rather should creatively expand the economy's own comparative institutional advantages.

This essay is based on the author's recent study *The Dynamics of German Industry. Germany's Path toward the New Economy and the American Challenge*, New York, Oxford 2005.

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